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SOME AMERICAN GEOMETRID MOTHS OF THE SUBFAMILY ENNOMINAE HERETOFORE ASSOCIATED WITH OR CLOSELY RELATED TO ELLOPIA TREITSCHKE

By Hahn W. Capps

For some time it has been apparent that the species assigned to the genus *Ellopia* Treitschke or *Therina* Hübner in our check lists[1] of North American Lepidoptera are not a homogeneous group considered on the basis of characters believed to indicate natural affinity and have needed reclassification. As originally planned, this paper was to be confined to the treatment of the species north of Mexico, but as the work progressed it became apparent that none of the American forms is congeneric with the European species *Therina fasciaria* (Linnaeus), genotype of *Ellopia* Treitschke and *Therina* Hübner. Furthermore, no species of true *Ellopia* occurs in the New World. In order to determine the relative value of characters for defining specific and generic categories, the scope of the paper was enlarged to include species occurring in Mexico, Central America, and South America which had previously been assigned to the genus or are obviously closely related to it.

This study is based on material in the collection of the United States National Museum supplemented by specimens borrowed from the collections of the Universities of Kansas and Michigan and that of John L. Sperry, and on types examined at the Academy of Natural Sciences of Philadelphia and Rutgers University. More than 800 specimens

[1] Hulst, U. S. Nat. Mus. Bull. 52, 1903 (part) ; Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, 1917 ; McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), 1938.

were studied, and to ascertain intraspecific variation of larval, venational, and genitalic structures approximately 300 microscopic slide mounts were prepared. The number of slide mounts for a species varies from 1 to 36, depending on the amount of material on hand.

Because there has been much confusion of the species in the literature, citations for food plants and localities are based entirely on labels associated with specimens examined by the author, unless specified otherwise. Much of this confounding of the species has probably been due to three factors: (1) Close similarity of the species, (2) extremely great intraspecific variation, and (3) lack of sufficient material to indicate or determine the range of intraspecific variation. The author strongly suspects that extensive collecting and rearing will, in the future, make untenable some of the forms that it now appears desirable to retain as food plant or geographical varieties.

The following brief diagnosis of *fasciaria* (Linnaeus), the genotype of *Therina*, is offered for comparative purposes: Male antenna bipectinate to apex; female antenna simple. Fore wing (fig. 3) with 12 veins, 10 and 11 from the cell; without areoles. Male genitalia (fig. 4) without gnathos; harpe with middle narrowly constricted, a costal arm from near base; vinculum well developed, narrowly extenuated; furca simple; aedeagus bifurcate. Female genitalia (fig. 20) with signum a small, weakly sclerotized plate. Larva with prolegs on fifth abdominal segment.

All the American forms treated here differ from *fasciaria* in the following respects: Fore wing (figs. 1, 2) with two areoles. Male genitalia (fig. 7); harpe simple, not constricted at middle, costa without an arm; vinculum not extenuated; aedeagus simple. Female genitalia (fig. 21) with signum a strongly sclerotized stellate, serrate or spinose plate. Larva without prolegs on fifth abdominal segment. In genitalia, they resemble species of *Nepytia* Hulst and *Cingilia* Walker. *Cingilia*, however, has a vestige of vein 5 at the margin of the hind wing and species of *Nepytia* are distinguishable by the crenulate or denticulate character of the transverse lines of fore wing.

Few studies of a revisional nature treating this subfamily have appeared, and though the four genera discussed in this paper do not constitute a recognized or definable group of supergeneric rank the following characters are common to the group and are cited to avoid repetition in generic descriptions: Male antennae bipectinate, plumose; pectinations not clavate, sometimes terminating before apex. Labial palpus slender, extending but slightly beyond the front; front evenly rounded, scales closely appressed. Fore wing (figs. 1, 2) broad; transverse posterior line, if present, from costa well before apex; 12 veins and 2 elongate areoles; vein 12 anastomosing with 11 and then separate to costa; 10 and 11 from cell; 8 and 9 stalked; 2 from cell

well before outer angle; 3 and 4 approximate at base; 1b bifurcate near base; fovea absent; male with a bar-like structure near base between cubitus and 1b. Hind wind (fig. 1A) broad; transverse line, if present, appearing as a continuation of the transverse posterior line of the fore wing; outer margin slightly or strongly produced at vein 4 (removal of scales often necessary to note this); veins 6 and 7 approximate from cell [except the genus *Evita* (fig. 2A) in which they are stalked].

Male genitalia: Uncus simple, strong, hooklike; socii short or rudimentary; gnathos well developed with numerous spines; harpe simple; lateral arms of anellus strongly sclerotized, extending almost to costa of harpe; furca simple, only the right branch developed (in ventral view); aedeagus slender, cylindrical, narrowed posteriorly, distal end with a rather strongly sclerotized extenuated platelike structure with the margin serrate or scobinate.

Female genitalia: Signum a strongly sclerotized plate, margin serrate or spinose; ductus bursae strongly sclerotized or with a narrow, more or less complete internal sclerotized band posteriorly near junction with bursa copulatrix; ductus seminalis from near junction of ductus bursae and the bursa.

The variability in the shape of the wings and venation, particularly the fore wing, prevents extensive use of such characters as the origin of the veins, degree of anastomosis, stalking, or size and shape of the areoles for separating genera of the Ennominae. Hence, as has proved useful to other workers seeking a more natural classification of difficult groups, the employment of genitalic structures for the restriction of genera when other characters were unsatisfactory appears to be adaptable to the development of a more desirable rearrangement of the species of this subfamily, and on this basis the author has undertaken a study of the American Ennominae and is preparing a revision of the group.

KEY TO THE GENERA

1. Hind wing with veins 6 and 7 stalked ..... Evita, new genus
   Hind wing with veins 6 and 7 not stalked 2
2. Fore wing with 3 transverse lines ..... Besma, new genus
   Fore wing with 2 transverse lines 3
3. Aedeagus of male with a rather strongly sclerotized bifurcate plate distoventrally; ventral margin of genital opening of female bordered by a narrow, strongly concave, sclerotized band; central area of signum with spinules ..... Neotherina Dognin
   Aedeagus of male without a sclerotized bifurcate plate distoventrally; ventral margin of female genital opening not bordered by a sclerotized band; central area of signum without spinules ..... Lambdina, new genus

Genus NEOTHERINA Dognin

Neotherina Dognin, Ann. Soc. Ent. Belgium, vol. 57, p. 402, 1913. (Genotype: *Neotherina inconspicua* Dognin.)

In addition to characters noted for the group: Apex of male antenna simple. Fore wing with two transverse lines, evenly curved; hind wing with one transverse line. Male genitalia with gnathos armed with long slender spines; aedeagus with a sclerotized bifurcate plate distoventrally. Female genitalia with a strongly sclerotized, narrow concave band bordering ventral margin of genital opening; signum a strongly sclerotized plate, central area with spinules, margin spinose or serrate.

Remarks.—*Neotherina* Dognin does not appear in the nomenclators of either Schulze or Neave. The name was used, apparently for the first time in the literature, for a new species, *inconspicua*, described by Dognin in 1913 without any generic diagnosis. Dognin stated that *inconspicua* resembled *Neotherina axion* (Druce) but with the lines different, thus assigning *Therina axion* Druce to the genus. An examination of the type will be necessary to determine the true position of *axion*, but from the figures [2] representing it I suspect that it is more closely related to *Lambdina calidaria* (Dyar) and possibly synonymous with it.

The Dognin species, *inconspicua*, also resembles *Therina axona* Druce, but differences in genitalic structure place them in separate genera; the latter is referable to *Destutia* Grossbeck.

Superficially, the species of *Neotherina* resemble those of *Lambdina*; the males, however, are easily separable by the simple apex of the antenna and furcate plate of the aedeagus and the females by the concave sclerotized band near ventral margin of genital opening. Some species of *Besma* have similar genitalia but are easily separated by the three transverse lines on fore wing.

KEY TO SPECIES OF NEOTHERINA

1. Hind wing with a medial transverse line passing through outer angle of discal cell ..... 1. inconspicua Dognin
   Hind wing with a postmedial transverse line, well beyond outer angle of discal cell ..... 2. ♂ imperilla (Dognin)
   3. ♀ consequens (Prout)

1. NEOTHERINA INCONSPICUA Dognin

PLATE 2, FIGURES 5–5C; PLATE 9, FIGURES 27–27A

Neotherina inconspicua Dognin, Ann. Soc. Ent. Belgium, vol. 57, p. 402, 1913.

Male.—Head and collar yellow; palpus yellowish, second and third joints irrorated with fuscous scales. Thorax and wings ocherous with

[2] Druce, in Biologia Centrali-Americana, Insecta, Lepidoptera-Heterocera, vol. 3, tab. 45, figs. 25, 26, 1881–1900.

a red-brown tinge. Fore wing with the transverse anterior line evenly curved; transverse posterior line straight from costa to vein 6 and then slightly angled inwardly to inner margin. Medial transverse line of the hind wing straight or very slightly curved. All lines testaceous edged with yellow.

Alar expanse, 29–34 mm.

Genitalia (figs. 5–5A): Uncus a strong hook, gradually expanding basally; harpe simple, rather stout, costa short, its length less than width of harpe at base; furca extending to or beyond costa of harpe, distal end bent mesad, angled portion armed with numerous fine spines; aedeagus with a narrow extenuated plate distally and a large patch of long slender cornuti.

Female.—Similar to the male in color and markings.

Alar expense, 32–36 mm.

Genitalia (figs. 27–27A): Ventral operculum moderately sclerotized, weaker posteriorly; ductus bursae rather long, more than twice the length of internal band near junction with the bursa; bursa narrow, elongate; signum a narrow spinose plate.

Type.—U.S.N.M. No. 31153.

Type locality.—Lino, Panama.

Food plant.—Unknown.

Distribution.—Costa Rica: Juan Vinas (Jan., June). Guatemala: Chejel (June), Guatemala City (June). Mexico: Jalapa, Orizaba (Sept.). Panama: Lino.

Nine specimens examined.

Remarks.—As stated previously, the genitalic structures are extremely variable for the whole group. Figures 5B and 5C indicate the intraspecific variation of the gnathos and furca for this species.

2. NEOTHERINA IMPERILLA (Dognin), new combination

Plate 2, Figure 6, 6A

Nephodia imperilla Dognin, Hétérocères nouveaux de l'Amérique du Sud, fasc. 4, p. 21, 1911.

Male.—Front pale brown, slightly ocherous; abdomen and wings gray-brown with a slight reddish tinge. Fore wing with two testaceous transverse lines; transverse anterior line evenly curved; transverse posterior line straight from costa to vein 6 and then evenly bent inwardly to inner margin. Hind wing with a postmedial line, evenly curved, well beyond outer angle of the discal cell.

Alar expanse, 36 mm.

Genitalia (figs. 6, 6A) similar to those of *inconspicua*; distal spined portion of furca smaller; fewer cornuti.

Female.—Unknown.

Type.—U.S.N.M. No. 32660.

Type locality.—Cañon de Tolima (1,700 meters), Colombia.

Remarks.—The species is represented in the National Museum collection only by the holotype, and this is in rather poor condition. It resembles *inconspicua*, but the general color is more testaceous and it lacks the chrome-yellow on head, collar, and borders of the transverse lines. The postmedial line of the hind wing of *imperilla* is evenly curved and beyond the outer angle of the cell; that of *inconspicua* is more nearly medial, almost straight, and passes through the outer angle of the cell.

3. NEOTHERINA CONSEQUENS (Prout), new combination

PLATE 9, FIGURE 28

Nephodia (Nipteria) consequens PROUT, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 524, 1910.

Male.—Unknown.

Female.—Similar to *imperilla* in color and markings.

Alar expanse, 42 mm.

Genitalia (fig. 28) similar to those of *inconspicua* but with the signum flatter and broader and the margin serrate instead of spinose.

Type.—In British Museum.

Type locality.—Santo Domingo, Carabaya, Peru.

Food plant.—Unknown.

Remarks.—The species is represented in the National Museum collection by a single specimen. Prout stated that he had seen one specimen in addition to the type from the same locality. Presumably this is the one in the National Museum, since the label indicates the type locality and the specimen was a part of the Dognin collection.

Eventually *imperilla* and *consequens* may prove to be opposite sexes of one species, but until this is verified by the examination of material (including both sexes) from the two regions they should be treated as distinct species.

LAMBDINA, new genus

Genotype.—Ellopia fiscellaria Guenée.

With characters noted for the group and in addition: Antenna of male bipectinate to apex. Fore wing broad with two transverse lines, the transverse posterior line from costa well before apex. Hind wing with a single transverse line, occasionally indistinct; veins 6 and 7 approximate. Male genitalia with gnathos armed with numerous coarse spines; aedeagus without a distoventral bifurcate plate. Female genitalia with signum a broad, strongly sclerotized plate, central area without spinules, margin serrate; ventral margin of the genital opening not bordered by a continuous sclerotized band.

Remarks.—The species of *Lambdina* closely resemble those of *Neotherina* but are easily separated by genitalic characters. In *Lambdina* the aedeagus is without a distoventral sclerotized furcate plate; there is no concave sclerotized band bordering the ventral margin of the female genital opening and the central area of the signum is without spines and comparatively smooth.

Because of variability in color, maculation, and genitalia within the genus it is impossible to make satisfactory keys. The following keys are offered merely to help in identification of the species and should be used with caution. For similar reasons it is impracticable to include subspecific categories and these are omitted from the keys.

KEY TO SPECIES OF LAMBDINA

Males

1. American species north of Mexico[3] 2
   Mexican and Central American species 4
2. Furca long, slender, laterally compressed 3
   Furca short, stout, not compressed ..... 14. punctata (Hulst)
3. Fore wing with transverse lines evenly curved, diffuse or rather indistinct, accentuated by fuscous dots on veins ..... 9. athasaria (Walker)
   Fore wing with transverse lines sinuate, rather sharply defined, if nearly straight or evenly curved not strongly accentuated on veins by fuscous dots ..... 2. fiscellaria (Guenée)
4. Fore wing broad; transverse lines indistinct, accentuated by fuscous dots on veins. Aedeagus somewhat extenuated posteriorly; a large patch of cornuti ..... 13. negata (Dyar)
   Fore wing narrower; transverse lines rather distinct, only slightly if accentuated on veins. Aedeagus strongly extenuated posteriorly; a small patch of cornuti ..... 7. axion (Druce)

Females

1. American species north of Mexico 2
   Mexican and Central American species 4
2. With ventral operculum strongly sclerotized 3
   Without a strongly sclerotized ventral operculum ..... 14. punctata (Hulst)
3. Fore wing with transverse lines evenly curved, diffuse or rather indistinct, accentuated by fuscous dots on veins ..... 9. athasaria (Walker)
   Fore wing with transverse lines sinuate, rather sharply defined, if nearly straight or evenly curved not strongly accentuated on veins by fuscous dots ..... 2. fiscellaria (Guenée)
4. Ductus bursae at least three times as long as posterior internal band ..... 7. axion (Druce)
   Ductus bursae shorter, less than three times length of posterior internal band 5
5. Posterior internal band of ductus bursae extenuate posteriorly ..... 8. calidaria (Dyar)
   Posterior internal band of ductus bursae not extenuate posteriorly ..... 13. negata (Dyar)

[3] The Hübner species, *fervidaria,* is omitted because the type has been lost, and there is no certainty as to just what it represents.

1. LAMBDINA FERVIDARIA (Hübner)

Thcrina fervidaria Hübner, *in* Geyer, Zuträge zur Sammlung exotischer Schmetterlinge, vol. 3, p. 8, No. 205, figs. 409, 410, 1831.—Hulst, U. S. Nat. Mus. Bull. 52, p. 334, 1903 (part).

Ellopia fervidaria (Hübner) Guenée, Histoire naturelle des insectes lépidoptères, vol. 9, p. 132, 1857.—Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, No. 4655, 1917.—McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 4159, 1938.

Male.—Unknown except for the "Hübner" figure illustrating the species, from which this description is prepared.

Head, thorax, abdomen, and upper surface of wings uniformly brownish ocher, with a conspicuous sprinkling of fuscous on costal area of fore wing extending from base of wing to posterior transverse line, fuscous irroration stronger basally; a narrow border similarly dusted with fuscous along outer margins of fore and hind wings. Transverse lines and discal dots dark brownish ocher with conspicuous ocherous borders, evenly curved (not strongly sinuate). Fore wing with transverse posterior line extending from costa slightly outward to vein 4 and then slightly curved inwardly to inner margin. Hind wing with the postmedial transverse line slightly bent or evenly curved. Outer margins of both wings slightly angular; hind wing with a slight production indicated between veins 3 and 4 (normally this should occur at vein 4).

Under surface of the wings pale ocherous along costa and the outer margins; a somewhat darker brownish ocherous suffusion extending basally from transverse posterior line of fore wing and the postmedial transverse line of the hind wing. Abdomen, thorax, legs and collar irrorated with fuscous. Discal dot and anterior transverse line of fore wing obsolete; transverse posterior line faintly defined; postmedial transverse line of the hind wing similarly indicated.

Alar expanse, 35 mm.

Female.—Unknown.

Type.—Lost (?)

Type locality.—Georgia.

Food plant.—Unknown.

Remarks.—The figures illustrating *fervidaria* in the original German edition are not identical with those of the English facsimile of the Zuträge. In the figures of the latter work, the conspicuous ocherous borders of the transverse lines are absent and the outer margins of the wings are slightly more rounded, resembling those of *pellucidaria*.

I have seen no example of any species of *Lambdina* that agrees in detail with Hübner's figure, nor any specimens of *Lambdina* from the type locality except a few examples of *pellucidaria*, which is evidently

not what Hübner had. Presumably *fervidaria* represents an oak-feeding form and is, in my opinion, nothing but a color variety or race of *fiscellaria*. If this should prove to be true, Hübner's name will take precedence and have to be applied to the complex now under *fiscellaria*.

2. LAMBDINA FISCELLARIA FISCELLARIA (Guenée)

PLATE 1, FIGURES 1, 1A; PLATE 3, FIGURES 7, 7A; PLATE 8, FIGURE 21.

Ellopia fiscellaria GUENÉE, Histoire naturelle des insectes lépidoptères, vol. 9, p. 133, 1857.—BARNES and MCDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4654, 1917.—MCDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5146, 1938.

Therina fiscellaria (Guenée) HULST, U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Ellopia flagitiaria GUENÉE, Histoire naturelle des insectes lépidoptères, vol. 9, p. 133, 1857. (New synonymy.)

Therina fiscellaria var. *peccaturia* SWETT, Psyche, vol. 16, p. 96, 1909.

Therina fiscellaria var. *johnsoni* SWETT, Can. Ent., vol. 45, p. 174, 1913.

Ellopia turbataria BARNES and MCDUNNOUGH, Contr. Nat. Hist. Lepid. North America, vol. 3, No. 4, p. 255, 1917.—MCDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5148, 1938. (New synonymy.)

Male.—Color variable, ranging from a uniformly pale whitish ocher to smoky fuscous; ocherous forms variable in the degree of sprinkling of fuscous scales.

Forewing with two transverse lines, darker than the ground color, sinuate or evenly curved and rather sharply defined; occasionally with the area between the lines somewhat darkly suffused; transverse anterior line from costa well before middle of the wing, usually edged inwardly with ocherous; transverse posterior line from costa well before the apex, usually edged outwardly with ocherous.

Hind wing with a single transverse line, usually edged outwardly with ocher; outer margin produced at vein 4.

Alar expanse, 32–45 mm.

Genitalia (figs. 7, 7A): Gnathos broad, with numerous coarse spines; furca long, extending almost to or beyond costa of harpe, compressed laterally, with spinules along dorsal surface; anellus broad, moderately sclerotized, somewhat scobinate with the scobinations stronger basally, lateral arms strongly sclerotized, long and extending almost to costa of harpe; aedeagus armed distally and ventrally with an extenuated sclerotized structure which is scobinate along the margin; penis with a patch of long, slender, deciduous cornuti.

Female.—Similar to male in color and markings.

Alar expanse, 30–40 mm.

Genitalia (fig. 21): Ventral operculum strongly sclerotized; ventral margin of genital opening without a bordering sclerotized band;

ductus bursae with a narrow, sclerotized internal band near junction with the bursa; signum a broad, strongly sclerotized, concave plate with serrate margin.

Types.—In the United States National Museum (*fiscellaria*, No. 55719; *turbataria*, No. 55721); Boston Society of Natural History (*johnsoni*, *peccataria*); British Museum (?) (*flagitiaria*).

Type localities.—"Amérique Septentrionale" (*fiscellaria*); Maine (*johnsoni*); Massachusetts (*peccataria*); New York, Canada (*flagitiaria*).

Food plants.—*Abies*, *Quercus*, *Tsuga*.

Distribution.—UNITED STATES: *Connecticut* (Aug., Sept.), *Illinois* (Aug., Sept.), *Iowa* (Sept.), *Maine* (Sept.), *Massachusetts* (Sept.), *Michigan* (May, Aug., Sept.), *New Hampshire*, *New Jersey*, *New York* (Aug.), *Pennsylvania* (Sept., Oct., Nov.), *Rhode Island* (Aug.), *Wisconsin*. CANADA: *Manitoba* (July, Aug., Sept.), *Ontario* (Aug., Sept.), *Quebec* (Sept.).

One hundred and seventy-seven specimens examined.

Remarks.—Four names listed as synonyms of *fiscellaria* are considered unworthy of subspecific status because they are based on either aberrant or inconstant variations. Specimens exhibiting melanism in varying degrees are not unusual in the group. The evidence in each case is briefly reviewed:

The name *flagitiaria* is based on rather pale ocherous specimens showing a somewhat smoky suffusion between the transverse lines, the suffusion more intense adjacent to the lines. While this form is easily separable from the paler and less distinctly marked specimens of *fiscellaria*, many intergrading specimens occur. Similar color variations occur within a series of *somniaria* and *lugubrosa*.

Swett's *peccataria* is based on a pale ocherous form with a slight fuscous suffusion on the fore wing between the transverse anterior line and the base of the wing and with a similar suffusion beyond the transverse posterior line, the suffusion broader and somewhat stronger below vein 4 and extending to the inner margin. Hind wing with a similar suffusion below vein 4, extending to inner margin. One of the specimens of *peccataria* is from Connecticut and was reared on *Quercus*. I have before me several specimens from Maine, reared on *Abies*, with a similar color pattern but with the ground color slightly darker and the suffusion stronger. I consider these and Swett's *peccataria* to be merely aberrants.

The name *johnsoni* is based on a dark smoky form, with the upper surface of wings rather smooth, somewhat sheeny, the transverse lines usually with bright yellow borders. This is merely a very dark melanic form of *fiscellaria*. Intergrades occur in material from Massachusetts and Michigan. Swett described *johnsoni* from a single male specimen.

Barnes and McDunnough dissected a male paratype of *turbataria* and commented on the possible unreliability of the genitalic characters used for separating it from *fiscellaria*. I have dissected the type, and the genitalia as compared with those of the paratype are as follows: Furca longer, slightly stouter, with the spinules more numerous, extending to base; anellus more scobinate; aedeagus, with a large patch of cornuti (deciduous). On the basis of the genitalia the type is inseparable from examples of *fiscellaria*.

There are specimens from Michigan, Massachusetts, Nebraska, and New York agreeing in habitus and maculation with typical *turbataria* from Pennsylvania. From Connecticut there are examples which intergrade between the so-called *turbataria* and typical *fiscellaria*. The name *turbataria*, I believe, represents nothing more than a color form; certainly it cannot designate any local race. The course of the posterior transverse line of the wing is not constant in a series.

3. LAMBDINA FISCELLARIA SOMNIARIA (Hulst)

Ellopia somniaria Hulst, Ent. Amer., vol. 1, p. 208, 1886.—Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, No. 4657, 1917.—McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5147, 1938.

Therina fervidaria somniaria (Hulst) Hulst, U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Male.—Similar to *fiscellaria* but specimens of *somniaria* averaging larger, slightly darker ocherous, more heavily dusted with fuscous, and with the transverse lines more distinct.

Alar expanse, 28–48 mm.

Genitalia like those of *fiscellaria*.

Female.—Similar to male in color and markings.

Alar expanse, 32–40 mm.

Genitalia like those of *fiscellaria*.

Type.—In Rutgers College collection.

Type localities.—Oregon, "Washington Territory," and Vancouver Island.

Food plant.—*Quercus.*

Distribution.—United States: *California, Oregon* (Aug., Sept.), *Washington* (Aug., Sept.). Canada: *British Columbia* (Aug., Sept.), *Vancouver Island.*

One hundred and twenty-five specimens examined.

Remarks.—On the average, specimens of *somniaria* are larger, a slightly ocherous with the dusting of fuscous more intense and with the transverse lines more distinct than in specimens of typical *fiscellaria*. The tendency of *somniaria* to be more uniform in size, color, and maculation is probably due to the fact that most of the material originated in a somewhat restricted area (northwestern United

States and the adjacent Canadian region) where climatic conditions are rather constant and *Quercus garryana* is the prevailing oak. Two specimens from California, however, are indistinguishable from eastern examples of typical *fiscellaria;* one is from Plumas County, the other bears no additional label, and their food plant is unknown.

The area of distribution for typical *fiscellaria* is much greater than that of *somniaria* and the notable variation in a series of *fiscellaria* is probably effected by the more variable prevalent climatic conditions and the presence of several kinds of food material on which it feeds. Several species of *Quercus*, *Abies*, and *Tsuga* occur within the area.

Until more material is available, the name *somniaria* should be applied to the northwestern variety of *fiscellaria* on *Quercus*.

4. LAMBDINA FISCELLARIA LUGUBROSA (Hulst)

Therina lugubrosa Hulst, Can. Ent., vol. 32, p. 106, 1900; U. S. Nat. Mus. Bull. 52, p. 335, 1903.

Ellopia fiscellaria lugubrosa (Hulst) Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, No. 4654, 1917.—McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5146, 1938.

Male.—Color and maculation somewhat variable, ranging from a rather dull ocherous, heavily sprinkled with fuscous, to a dark, suffused, smoky fuscous, with a few sparsely scattered ocherous irrorations; occasionally with the area between the transverse lines of the fore wing darker, more strongly suffused, and with a similar suffusion of the hind wing extending from the transverse line basally. The ocherous borders of the transverse lines are variable in intensity.

Alar expanse, 32–38 mm.

Genitalia like those of typical *fiscellaria.*

Female.—Similar to male in color and markings.

Alar expanse, 30–39 mm.

Genitalia as in typical *fiscellaria.*

Type.—In Rutgers College collection.

Type locality.—Rossland, British Columbia.

Food plants.—*Abies*, *Tsuga.*

Distribution.—United States: *Idaho* (Sept.), *Maine* (Sept.), *Michigan* (Sept.), *Montana*, *Washington* (Sept., Oct.), *Wisconsin* (July, Sept.). Canada: *British Columbia* (Sept.), *Nova Scotia* (Sept.).

Fifty-four specimens examined.

Remarks.—Examples of *lugubrosa* exhibit less uniformity than *somniaria* but more than typical *fiscellaria.* Its range of distribution and the variety of material on which it feeds are greater than those of *somniaria* but less than those of *fiscellaria.*

J. J. de Gryse[4] studied larvae of *somniaria* from Vancouver Island, British Columbia, and compared them with larvae of the "Eastern Hemlock Looper" from the Muskoka Lakes region in the Province of Ontario. He noted slight differences in the mandibular structure but stated that owing to the scarcity of material the constancy of the differences could not be adequately checked. I have made numerous dissections of the specimens available, examining the parts in situ and mounted on slides. The mandibles not only exhibit considerable variation individually, but also vary in the different instars. No differences were observed that persisted with sufficient constancy to enable accurate separation of the various forms.

For the present the name *lugubrosa* should be applied to the northern and rather dark, heavily dusted with fuscous, variety of *fiscellaria* on *Abies* and *Tsuga*.

5. LAMBDINA FISCELLARIA PULTARIA (Guenée)

Ellopia pultaria Guenée, Histoire naturelle des insectes lépidoptères, vol. 9, p. 131, 1857.—Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, No. 4556, 1917.—McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part I, Macrolepidoptera), No. 5150, 1938.

Ellopia scitata Walker, List of the lepidopterous insects in the collection of the British Museum, vol. 26, p. 1510, 1862.

Ellopia invexata Walker, List of the lepidopterous insects in the collection of the British Museum, vol. 26, p. 1512, 1862.

Therina fiscellaria (Guenée) Dyar, Psyche, vol. 10, p. 13, 1903.

Male.—Pale ocherous, fresh specimens with a slight testaceous tinge; surface of the wings smooth, sheeny, with the dusting of pale fuscous scales weak or obsolete; transverse lines evenly curved, less sinuate than usually present in typical *fiscellaria*.

Alar expanse 35–40 mm.

Genitalia like those of typical *fiscellaria*.

Female.—Similar to the male in color and markings.

Alar expanse, 30–38 mm.

Genitalia like those of typical *fiscellaria*.

Types.—In United States National Museum (*pultaria*, No. 55722); British Museum (*scitata*, *invexata*).

Type localities.—"Amérique Septentrionale" (*pultaria*); east Florida (*scitata*); no locality given for *invexata*.

Food plant.—Quercus.

Distribution.—United States: *Florida* (Apr., May).

Twenty-nine specimens examined.

Remarks.—The series is rather uniform in color and habitus, and for reasons similar to those regarding the retention of names to desig-

[4] Scientific Agriculture, vol. 14, No. 10, 1934.

nate other varieties, *pultaria* is retained for the southern oak-feeding race of *fiscellaria*. The prevailing oak of its habitat is *Quercus virginiana*.

6. LAMBDINA FISCELLARIA LAETA (Hulst)

Therina laeta HULST, Can. Ent., vol. 32, p. 107, 1900; U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Ellopia flavilinearia BARNES and MCDUNNOUGH, Contr. Nat. Hist. Lepid. North Amer., vol. 2, No. 3, p. 131, 1913.

Ellopia laeta (Hulst), BARNES and MCDUNNOUGH, Contr. Nat. Hist. Lepid. North Amer., vol. 3, No. 3, p. 186, 1916; Check list of the Lepidoptera of Boreal America, No. 4649, 1917.—MCDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5140, 1938.

Male.—Pale to dark ocherous, resembling *pultaria* but with the transverse lines a trifle straighter and usually with the wings more heavily dusted with fuscous.

Alar expanse, 27–35 mm.

Genitalia like those of typical *fiscellaria*.

Female.—Similar to the male in color and markings.

Alar expanse, 32–38 mm.

Genitalia like those of typical *fiscellaria*.

Types.—In Rutgers College collection (*laeta*); United States National Museum (*flavilinearia*, No. 55723).

Type localities.—New Mexico (*laeta*); Palmerlee, Ariz. (*flavilinearia*).

Food plant.—Unknown.

Distribution.—UNITED STATES: *Arizona* (Mar., Apr., May, July, Aug.), *New Mexico* (Aug.).

Forty specimens examined.

Remarks.—This is probably an oak-feeding form, variable in size but rather uniform in color and maculation. For reasons previously discussed regarding varieties of *fiscellaria*, the name is retained for the southwestern race of *fiscellaria*. The prevailing oak is *Quercus utahensis*.

7. LAMBDINA CALIDARIA (Dyar)

PLATE 8, FIGURE 25, 25A

Therina calidaria DYAR, Proc. U. S. Nat. Mus., vol. 42, p. 88, 1912.

Male.—Unknown.

Female.—Cinereous, with a pale brownish-ocherous tinge and rather heavily sprinkled with pale fuscous. Transverse lines testaceous, evenly curved, not strongly sinuate, continuous between the veins; the lines with conspicuous ocherous borders.

Alar expanse, 35–40 mm.

Female genitalia (fig. 25) similar to those of typical *fiscellaria;* the internal band of ductus bursae somewhat more extenuated posteriorly. It is doubtful if this difference will prove to be constant in a large series.

Type.—U.S.N.M. No. 14245.

Type locality.—Zacualpan, Mexico.

Food plants.—Unknown.

Distribution.—Mexico: Zacualpan (Aug.).

Five specimens examined.

Remarks.—The examples of this species closely resemble those of the preceding one, *lacta*, and also those of *axion*, which is treated next. If the specimens of *axion* are correctly identified, as seems to be the case, eventually *calidaria* and *axion* may prove to be the Lower Sonoran and Tropical representatives of a single species, or an extreme southern race of *fiscellaria.* Until there is more information and material from the intervening areas of distribution, it seems desirable to treat them as specifically distinct from *fiscellaria.*

8. LAMBDINA AXION (Druce)

Plate 4, Figures 10, 10A; Plate 8, Figure 23

Therina axion Druce, *in* Biologia Centrali-Americana, Insecta, Lepidoptera-Heterocera, vol. 2, p. 50, 1892; vol. 3, tab. 45, figs. 25–26, 1881–1900.

Male.—Brownish ocherous, heavily sprinkled with fuscous; transverse lines fuscous, evenly curved, rather weak, chiefly indicated by dark marks on the veins; the lines with conspicuous ocherous borders.

Alar expanse, 27 mm.

Genitalia (figs. 10, 10A) similar to those of typical *fiscellaria*; aedeagus without an extenuated tip distally; strongly extenuated posteriorly (differences that may not be constant in large series).

Female.—Similar to the male in color and markings.

Alar expanse, 30–35 mm.

Genitalia (fig. 23) with the ductus bursae long and narrow, at least three times the length of posterior internal band (a doubtful character which may not hold through a long series).

Type.—In British Museum.

Type locality.—Amula, Guerrero, Mexico (6,000 feet).

Food plant.—Unknown.

Distribution.—Guatemala: Guatemala City (July). Mexico: Hidalgo, Orizaba, Zacualpan (Oct.). (Also recorded by Druce from Las Mercedes, Guatemala, and Volcan de Chiriquí, Panama.)

Five specimens examined.

Remarks.—The specimens studied are in the National Museum collection identified as *axion*, presumably by Dyar or Schaus; examina-

tion of the type will be necessary to verify the correctness of the determination and properly evaluate the name.

9. LAMBDINA ATHASARIA ATHASARIA (Walker)

PLATE 3, FIGURES 8, 8A, 8B, 8C; PLATE 8, FIGURES 22, 22A

Ellopia athasaria WALKER, List of lepidopterous insects in the collection of the British Museum, vol. 20, p. 163, 1860.—BARNES and MCDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4652, 1917.—HOUSER, Journ. Econ. Ent., vol. 20, pp. 299–301, 1927.—MCDUNNOUGH, Check list of the Lepidoptera of Canada and United States of America (Part 1, Macrolepidoptera), No. 5143, 1938.

Ellopia aequaliaria WALKER, List of the lepidopterous insects in the collection of the British Museum, vol. 20, p. 164, 1860.

Ellopia seminudata WALKER, List of the lepidopterous insects in the collection of the British Museum, vol. 26, p. 1508, 1862.

Ellopia siccaria WALKER, List of the lepidopterous insects in the collection of the British Museum, suppl. 5, p. 1547, 1866.

Ellopia bibularia GROTE and ROBINSON, Ann. Lyc. Nat. Hist. New York, vol. 8, p. 455, 1867.

Therina semiundaria PACKARD, Rep. U. S. Geol. Surv. Terr., vol. 10, p. 495, 1876 [emendation for *seminudata* (Walker)].

Therina athasiaria (Walker) DYAR, Psyche, vol. 9, p. 10, 1900.—HULST, U. S. Nat. Mus. Bull. 52, p. 334, 1903 [misspelling of *athasaria* (Walker)].

Male.—Cinereous, with a slight testaceous tinge; wings heavily sprinkled with pale fuscous scales; transverse lines diffuse, not sharply defined, occasionally more strongly indicated on the veins by dots; lines evenly curved, not strongly sinuate. Wings thin, often semihyaline. Fore wing with the outer margin evenly curved or but slightly angled at vein 4. Hind wing with the outer margin evenly rounded or rarely slightly produced at vein 4.

Alar expanse, 28–38 mm.

Genitalia (figs. 8, 8A, 8B, 8C) similar to those of *fiscellaria*.

Female.—Similar to the male in color and markings.

Alar expanse, 30–37 mm.

Genitalia (figs. 22, 22A) similar to those of *fiscellaria*.

Types.—In British Museum (*athasaria*, *aequaliaria*, *seminudata*, *siccaria*); Academy of Natural Science of Philadelphia (*bibularia*).

Type localities.—New York (*athasaria*); Canada (*aequaliaria*); Orilla (West Canada) (*seminudata*); North America (*siccaria*); "Atlantic District (Penna.!)" (*bibularia*).

Food plants.—*Quercus*[5], *Tsuga*.

Distribution.—UNITED STATES: *District of Columbia* (Apr., May, July), *Illinois* (July), *Massachusetts* (May, Dec.[6]), *Missouri* (June), *New Hampshire* (June), *New Jersey* (May), *New York* (May, June), *Ohio* (Sept.), *Pennsylvania* (Apr., May, June), *Wisconsin*.

Ninety-nine specimens examined.

[5] Dyar, Psyche, vol. 9, p. 10, 1900.

[6] Reared material, issued in laboratory, Irving State Forest, Mass.

Remarks.—Resembling typical *fiscellaria*, especially the pale forms, which are probably *Quercus* feeders; and without differences in genitalic structure of sufficient constancy for accurate separation. However, in view of differences in biology and rather constant habitus *athasaria* is regarded as a distinct species. The transverse lines of *fiscellaria* are usually more clearly defined and more sinuate than those of *athasaria* which usually has the lines evenly curved and diffuse, often accentuated on the veins. *L. fiscellaria* passes the winter in the egg stage and *athasaria* in the pupal stage.

As with *fiscellaria*, several names are retained to designate subspecific segregates and typical *athasaria* is restricted to the eastern oak and hemlock-feeding variety.

10. LAMBDINA ATHASARIA PELLUCIDARIA (Grote and Robinson)

Ellopia pellucidaria Grote and Robinson, Ann. Lyc. Nat. Hist. New York, vol. 8, p. 456, 1867.—Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, No. 4651, 1917.—McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5142, 1938.

Therina pellucidaria (Grote and Robinson) Dyar, Psyche, vol. 9, p. 21, 1900.—Hulst, U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Male.—Closely resembling typical *athasaria*, somewhat darker smoky fuscous with the upper surface of the wings appearing rather smooth and uniform with the irrorations weak or obsolete.

Alar expanse, 29–40 mm.

Genitalia like those of typical *athasaria.*

Female.—Similar to the male in color and markings.

Alar expanse, 28–38 mm.

Genitalia like those of typical *athasaria.*

Type.—In Academy of Natural Sciences of Philadelphia.

Type locality.—"Atlantic District (Penn.!)"

Food plants.—Pinus.

Distribution.—United States: *Arkansas*, *Florida*, *Georgia* (Apr.), *Maryland* (Mar.), *Massachusetts* (May, June), *New Jersey* (May), *New York* (June), *North Carolina* (Apr.), *Ohio* (June), *Rhode Island*, *Virginia*, *Washington Territory* (possibly mislabeled; one specimen from the Edward Graef collection).

Eighty-eight specimens examined.

Remarks.—The name should be restricted to the eastern pine-feeding variety.

11. LAMBDINA ATHASARIA VITRARIA (Grote)

Ellopia vitraria Grote, Trans., Kansas Acad. Sci., vol. 8, p. 51, 1882.—Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, No.

4647, 1917.—McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5136, 1938.

Therina vitraria (Grote) Hulst, U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Male.—Pale ocherous, with a light sprinkling of fuscous scales on the wings. Transverse lines on fore wing evenly curved, often weak or obsolete between the veins, usually more strongly accentuated on the veins. Transverse line of hind wing often continuous.

Alar expanse, 30–35 mm.

Genitalia similar to those of typical *athasaria.*

Female.—Similar to the male in color and markings.

Alar expanse, 27–35 mm.

Genitalia similar to those of typical *athasaria.*

Type.—U.S.N.M. No. 34295.

Type locality.—New Mexico.

Food plant.—Unknown (probably *Quercus*).

Distribution.—United States: *Colorado* (June, July), *New Mexico* (July, Aug.).

Nineteen specimens examined.

Remarks.—Specimens of *vitraria* resemble typical *athasaria* in habitus but with the average size smaller, irrorations weaker, general color somewhat more ocherous, and the transverse lines of the fore wing more obscure, usually indicated only by dots on the veins. No constant structural differences were observed. The name should be applied to the rather small, pale ocherous southwestern race of *athasaria.*

12. LAMBDINA ATHASARIA JACULARIA (Barnes and McDunnough)

Ellopia jacularia Barnes and McDunnough, Contr. Nat. Hist. Lepid. North America, vol. 3, No. 4, p. 254, 1917.—McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5137, 1938.

Male.—Resembles *vitraria* but is larger and a trifle darker with the sprinkling of fuscous scales heavier; transverse lines of the fore wing somewhat stronger (as in typical *athasaria*).

Alar expanse, 35–40 mm.

Genitalia similar to those of *vitraria.*

Female.—Unknown.

Type.—U.S.N.M. No. 55724.

Type locality.—Jemez Springs, N. Mex.

Food plants.—Unknown (probably *Quercus*).

Distribution.—United States: *New Mexico* (Apr., May).

Seven specimens examined.

Remarks.—Barnes and McDunnough noted the close relationship of *jacularia* and *vitraria* but stated that the genitalia differed, the

spined area (cornuti) of the penis being absent and the furca shorter and broader in *vitraria* than in *jacularia*. Their conclusions were based on the genitalia of one dissected specimen, a paratype of *jacularia*. The genitalia of the type have the furca longer and slenderer than the paratype, and there is a patch of cornuti on the penis (these are deciduous in every species of the group). Aside from the fact that the specimens and genitalia of *jacularia* are slightly larger than those of *vitraria* there are no essential differences.

The close similarity of *jacularia* and *vitraria*, their collection dates (*jacularia*, Apr., May; *vitraria*, June, July, Aug.), and their distribution (*jacularia*, New Mexico; *vitraria*, Colorado, New Mexico) suggest that they may be earlier and later generations of the same form. Until this is verified by future rearings, it is believed advisable to treat them separately and to use the name *jacularia* for the larger, darker ocherous, rather heavily dusted fuscous, southwestern race of *athasaria*.

13. LAMBDINA NEGATA (Dyar)

PLATE 3, FIGURES 9, 9A; PLATE 8, FIGURE 24

Therina negata DYAR, Insecutor Inscitiae Menstruus, vol. 6, p. 136, 1918.

Male.—Dull brownish ocherous, with a slight testaceous tinge; heavily sprinkled with pale fuscous scales; transverse lines evenly curved, obsolete between the veins and chiefly indicated by fuscous dots on the veins, occasionally with faint ocherous borders.

Alar expanse, 33 mm.

Genitalia (figs. 9, 9A) similar to those of *athasaria*, except aedeagus not conspicuously extenuated posteriorly and the distal plate only slightly produced (probably an individual rather than a specific character).

Female.—Similar to the male in color and markings.

Alar expanse, 35 mm.

Genitalia (fig. 24) similar to those of *athasaria*, but internal band of the ductus bursae not extenuated posteriorly (perhaps an individual rather than specific difference).

Type.—U.S.N.M. No. 21739.

Type locality.—Zacualpan, Mexico.

Food plants.—Unknown.

Distribution.—MEXICO: Orizaba, Zacualpan (Oct.).

Two specimens examined.

Remarks.—Closely resembles, and scarcely separable from, the less distinctly marked examples of *jacularia*. A larger series will be necessary to determine the distinctness or synonymy of the two forms; *negata* may represent only a Mexican race of *athasaria*.

14. LAMBDINA PUNCTATA PUNCTATA (Hulst)

PLATE 4, FIGURES 11, 11A, 11B, 11C; PLATE 9, FIGURE 26

Therina punctata HULST, Can. Ent., vol. 30, p. 215, 1900; U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Ellopia punctata (Hulst) BARNES and MCDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4648, 1917.—MCDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5138, 1938.

Male.—Cinereous, with a brownish-ocherous tinge, often with a conspicuous sprinkling of fuscous scales. Transverse lines dark, sinuate, occasionally accentuated on the veins by dots; pale, specimens with the transverse lines faint or absent.

Alar expanse, 25–37 mm.

Genitalia (figs. 11, 11A, 11B, 11C) : Gnathos narrow; anellus short; furca short, not compressed; penis without cornuti.

Female.—Similar to the male in color and markings.

Alar expanse, 24–38 mm.

Genitalia (fig. 26) : Ventral operculum only partially sclerotized or sclerotization absent; sclerotization along ventral margin of the genital opening incomplete (central portion not sclerotized); posterior internal band of ductus bursae not heavily sclerotized; bursa copulatrix elongate; signum ovate with margin serrate.

Type.—In Rutgers College collection.

Type locality.—Glenwood Springs, Colo.

Food plant.—*Quercus.*

Distribution.—UNITED STATES: *Arizona* (June, July, Sept.), *Colorado* (Aug., Sept., Oct.), *New Mexico* (Sept.), *Utah* (Aug., Sept.).

Eighty-one specimens examined.

Remarks.—Superficially this species closely resembles *vitraria*, but it has the transverse posterior line more sinuate. The genitalia of the two forms are distinct. The males of *punctata* are easily recognized by the narrow gnathos, the short anellus, and the short stubby furca, and the females by the absence of or partial sclerotization of the ventral operculum, the incomplete sclerotization along ventral margin of the genital opening, and the smaller, less concave signum.

15. LAMBDINA PUNCTATA PHANTOMA (Barnes and McDunnough)

Ellopia (*Therina*) *phantoma* BARNES and MCDUNNOUGH, Contr. Nat. Hist. Lepid. North America, vol. 3, No. 1, p. 31, 1916.

Ellopia phantoma BARNES and MCDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4648, 1917.—MCDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5139, 1938.

Male.—Pale cinereous, with a slight ocherous tinge; wings with a light sprinkling of pale fuscous scales, more intense on the fore wing; transverse lines of fore wing dark, sinuate, and continuous, transverse line of hind wing less distinct.

Alar expanse, 27–31 mm.

Genitalia like those of typical *punctata.*

Female.—Similar to the male in color and markings.

Alar expanse, 27–31 mm.

Genitalia like those of typical *punctata.*

Type.—U. S. N. M. No. 55725.

Type locality.—White Mountains, Ariz.

Food plant.—Quercus.

Distribution.—United States: *Arizona* (June, July).

Eighteen specimens examined.

Remarks.—The examples of *phantoma* differ only slightly from those of *punctata.* They average a trifle paler, more ocherous, and with the transverse lines usually more distinct than in typical *punctata* but are scarcely distinguishable from obscurely marked examples. I believe that *phantoma* represents nothing more than a local alpine race of *punctata* in northern Arizona and should be regarded as such for the present.

BESMA, new genus

Genotype.—Metanema quercivoraria Guenée.

In addition to characters noted for the group: Apex of male antenna simple. Fore wing broad, with three transverse lines. Hind wing with two transverse lines, the outer rather strongly curved outward. Male genitalia with the spines of gnathos numerous, short and very fine or long and slender; furca with the spines more numerous toward distal end. Female genitalia with ventral margin of genital opening bordered by sclerotized band, the band not strongly concave; signum a broad stellate plate, with spinules on its central area.

Remarks.—Members of this genus are easily recognized by the presence of an additional transverse line (the subterminal) on the fore and hind wings. The subterminal lines are often more distinct on the under side of the wings.

The following keys are offered as an aid to identification of the species and reservations made for the keys of *Lambdina* also apply here.

KEY TO THE SPECIES OF BESMA

Males

1. American species north of Mexico 2
   Mexican and Central American species 4
2. Aedeagus with a strongly sclerotized ventrodistal bifurcation ..... 1. sesquilinearia (Grote)
   Aedeagus without such sclerotized ventrodistal bifurcation 3

3. Color pale testaceous, with a slight pinkish tinge, without conspicuous ocherous patches----------4. rubritincta (Cassino and Swett)
Coloration not as above----------5. quercivoraria (Guenée)
4. Aedeagus with a strongly sclerotized ventrodistal bifurcation
3. marilacta (Dyar)
Aedeagus without such ventrodistal bifurcation---------- 5
5. Gnathos broad; furca rather abruptly enlarged distally
8. mattearia (Schaus)
Gnathos narrower; furca not abruptly enlarged distally------7. brea (Druce)

Females

1. American species north of Mexico---------- 2
Mexican and Central American species---------- 4
2. Color pale testaceous, with a slight pinkish tinge, without conspicuous ocherous patches----------4. rubritincta (Cassino and Swett)
Coloration not as above---------- 3
3. Ventral margin of genital opening bordered by a rather broad, strongly sclerotized band with even anterior margin; ventral operculum strongly sclerotized----------5. quercivoraria (Guenée)
Ventral margin of genital opening bordered by a rather narrow, crinkled, moderately sclerotized band, anterior margin uneven
1. sesquilinearia (Grote)
4. Ventral margin of genital opening bordered by a rather broad, strongly sclerotized band with even anterior margin---------- 5
Ventral margin of genital opening bordered by a rather narrow, crinkled, moderately sclerotized band, anterior margin uneven
3. marilacta (Dyar)
5. Sclerotization of ductus bursae extensive, usually extending from genital opening to junction of ductus bursae with bursa
8. mattearia (Shaus)
Sclerotization of ductus bursae much less extensive, usually less than one-half length of ductus----------7. brea (Druce)

1. BESMA SESQUILINEARIA (Grote)

PLATE 6, FIGURES 16, 16A; PLATE 9, FIGURE 30

Endropia sesquilinearia GROTE, Can. Ent., vol. 15, p. 125, 1883.
Euchlaena sesquilinearia (Grote) HULST, U. S. Nat. Mus. Bull. 52, p. 341, 1903.—BARNES and MCDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4694, 1917.
Destutia sesquilinearia (Grote) MCDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5121, 1938.

Male.—Pale brownish ocherous, wings rather densely sprinkled with pale fuscous. Fore wing angulate; transverse anterior and posterior lines testaceous, nearly straight or evenly curved. Hind wing with outer margin rounded or but slightly produced at vein 4; transverse line evenly curved, appearing as a continuation of the posterior transverse line of fore wing.

Alar expanse, 42–45 mm.

Genitalia (figs. 16, 16A): Uncus rather short and stout, strongly dilated basally; gnathos well developed, broad and with many very fine spinules; costa of harpe straight or slightly convex; furca extending to or beyond costa of harpe; distal dilation slight and gradual; aedeagus with a strongly sclerotized asymmetrical ventrodistal bifurcation (fig. 16A), also armed distally with a strongly sclerotized and extenuated plate which is conspicuously broadened basally and scobinate along its margin; penis with a large patch of cornuti.

Female.—Similar to the male in color and markings.

Alar expanse, 37–45 mm.

Genitalia (fig. 30): Ventral operculum moderately sclerotized; sclerotized band bordering ventral margin of genital opening narrow, crinkled, anterior margin uneven; signum a disklike plate with long spinelike teeth.

Type.—U.S.N.M. No. 55726.

Type locality.—Arizona.

Food plant.—Unknown.

Distribution.—United States: *Arizona*, Cochise County (Mar., May, June, July, Aug.), White Mountains near Rice (July).

Thirty-eight specimens examined.

Remarks.—The examples representing this species taken early in the season (May) are more densely sprinkled with fuscous and noticeably larger (43–45 mm. wing expanse) than those taken later (June, July, Aug. Sept., expanse 32–38 mm.).

2. BESMA SESQUILINEARIA CAVILLARIA (Hulst)

Tetractis cavillaria Hulst, Ent. Amer., vol. 1, p. 203, 1886.

Metanema ♀ *novellata* Hulst, Ent. Amer., vol. 1, p. 204, 1886.

Therina cavillaria (Hulst) Hulst, U. S. Nat. Mus. Bull. 52, p. 335, 1903.

Sabulodes novellata (Hulst) Hulst, U. S. Nat. Mus. Bull. 52, p. 346, 1903.

Euchlaena cavillaria (Hulst) Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, No. 4695, 1917.

Destutia cavillaria (Hulst) McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5122, 1938.

Male.—Similar to typical *sesquilinearia* but averaging smaller, a trifle paler, and the sprinkling of fuscous scales less intense.

Alar expanse, 33–40 mm.

Genitalia like those of typical *sesquilinearia*.

Female.—Similar to the male in color and markings.

Alar expanse, 35–40 mm.

Genitalia like those of typical *sesquilinearia*.

Types.—In Rutgers College collection (*cavillaria*); United States National Museum (*novellata*, No. 34007).

Type localities.—Arizona (*cavillaria*, *novellata*).

Food plant.—Unknown.

Distribution.—UNITED STATES: *Arizona*, Cochise County (July, Aug., Sept.), Gila County (July), Graham County (June).

Twenty-seven specimens examined.

Remarks.—Collection dates indicate that typical *sesquilinearia* appears in the spring and early part of summer and that *cavillaria* is in flight from midsummer until fall (the periods would naturally vary according to the season). Intergrading forms occur during June and the early part of July. Again the evidence suggests that only seasonal forms are represented by the names but until this is verified by rearings, *cavillaria* should be kept as a variety.

McDunnough [7] noted the close similarity of *sesquilinearia* and *cavillaria* and the probability of their erroneous generic placement.

3. BESMA MARILACTA (Dyar)

PLATE 6, FIGURES 17, 17A; PLATE 10, FIGURE 35

Metanema marilacta DYAR, Proc. U. S. Nat. Mus., vol. 51, p. 27, 1916.

Male.—Pale whitish ocherous, sparsely sprinkled with testaceous. Resembles *sesquilinearia* somewhat in habitus and maculation, with the wings more angulate and the transverse lines rather obscure, not sharply defined; outer margins of the wings edged with testaceous scales.

Alar expanse, 38 mm.

Genitalia (figs. 17, 17A) somewhat similar to those of *sesquilinearia* but with harpe stouter, costa more convex and the furca abruptly enlarged distally.

Female.—Similar to the male in habitus and maculation but with the transverse lines more sharply defined and the posterior line somewhat concave inward.

Alar expanse, 38–40 mm.

Genitalia (fig. 35) similar to those of *sesquilinearia* but larger, with the narrow crinkled sclerotized band bordering ventral margin of genital opening more developed, the signum larger and more circular in form. Ventral operculum moderately sclerotized.

Type.—U.S.N.M. No. 18880.

Type locality.—Zacualpan, Mexico.

Food plant.—Unknown.

Distribution.—MEXICO: Cuernavaca (June), Zacualpan (Mar., Sept.).

Three specimens examined.

Remarks.—The series representing this species in the National Museum collection consists of one male from Zacualpan (March), the

[7] Contr. Nat. Hist. Lepid. North Amer., vol. 3, no. 3, p. 187, 1916.

female type (Zacualpan, September), and one female from Cuernavaca (June). Differences in character of the transverse lines of the male suggest that its association with the females may not be correct. The female from Cuernavaca is very similar in color and habitus to some examples of *cavillaria*, and except for the production of the outer margin of the hind wing at vein 4 it is scarcely separable. However, until more material and information are at hand, it will not be possible to define the limit of variation in the species, and the specimens under *marilacta* had best be left in their present association.

4. BESMA RUBRITINCTA (Cassino and Swett)

PLATE 5, FIGURES 14, 14A; PLATE 10, FIGURE 32

Sabulodes rubritincta CASSINO and SWETT, The Lepidopterist, vol. 4, No. 5, p. 37, 1925.

Destutia rubritincta (Cassino and Swett) McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5123, 1938.

Sabulodes rubritincta f. *nigripuncta* CASSINO and SWETT, The Lepidopterist, vol. 4, No. 5, p. 38, 1925.

Destutia rubritincta f. *nigripuncta* (Cassino and Swett) McDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5123, 1938.

Male.—Pale testaceous, with a slight ocherous tinge; transverse lines of wings somewhat darker testaceous, slightly curved. Fore wing with anterior and posterior transverse lines edged inwardly and outwardly respectively with pale ocherous; transverse anterior line occasionally only faintly indicated. Hind wing similar to fore wing in color and with a transverse line appearing as a continuation of transverse posterior line of fore wing, edged outwardly with pale ocherous. The subterminal lines often indistinct on upper surface of the wings.

Alar expanse, 35–38 mm.

Genitalia (figs. 14, 14A) similar to those of *quercivoraria* but with uncus stouter and the spinules of gnathos finer.

Female.—Color of body and upper surfaces of wings similar to those of the male. Under surfaces of wings with a rather dense sprinkling of fuscous and reddish brown scales. Wings more angulate than those of the male and outer margin of hind wing crenulate.

Alar expanse, 38–40 mm.

Genitalia (fig. 32) similar to and scarcely distinguishable from those of *quercivoraria*.

Types.—In Museum of Comparative Zoology.

Type localities.—Arizona, Pima County, Baboquivari Mountains.

Food plant.—Unknown.

Distribution.—United States: *Arizona.*

Ten specimens examined.

Remarks.—The occasional occurrence of specimens with fuscous patches of various shapes and sizes is not uncommon in many of the species of Geometridae. The name *nigripuncta* was applied by Cassino and Swett to a male form with a patch of fuscous scales on the fore wing just beyond the transverse posterior line near the inner margin; and to a female with a similar patch on hind wing near the inner margin and adjacent to transverse line in addition to the patch on the fore wing. In my opinion, *nigripuncta* represents nothing more than a color variant; and the name is therefore placed in synonymy.

5. BESMA QUERCIVORARIA (Guenée)

Plate 4, Figures 12, 12A; Plate 10, Figure 31

Metanema quercivoraria Guenée, Histoire naturelle des insectes lépidoptères, vol. 9, p. 172, 1857.—Packard, Rep. U. S. Geol. Surv. Terr., vol. 10, p. 544, 1876.—Hulst, U. S. Nat. Mus. Bull. 52, p. 342, 1903.—Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, No. 4726, 1917.

Metanema aclaria Walker, List of the lepidopterous insects in the collection of the British Museum, vol. 20, p. 260, 1860.

Metanema trilineata Packard, Rep. U. S. Geol. Surv. Terr., vol. 10, p. 542, 1876.

Endropia textrinaria Grote and Robinson, Ann. Lyc. Nat. Hist New York, vol. 8, p. 449, 1867.

Metanema incongruaria Hulst, Ent. Amer., vol. 2, p. 212, 1887.

Ellopia quercivoraria (Guenée) McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5145, 1938.

Male.—General color and maculation variable, ranging from a form that is uniformly pale ocherous, with the transverse lines rust-brown and rather distinct, to a form with the ocherous ground color almost obscured by a dense sprinkling of light rust-brown scales, which sometimes form irregular patches. Fore wing broad, angular, excavated between the apex and vein 4; subterminal line serrate, uneven. Hind wing produced at vein 4; subterminal line strongly curved outward.

Alar expanse, 26–38 mm.

Genitalia (figs. 12, 12A): Harpe simple, rather broad basally and narrowed apically; uncus slender; gnathos with numerous long, slender spines; anellus somewhat scobinate basally; furca with a patch of spinules at distal end; aedeagus with an augerlike sclerotized process distally, this process slightly produced and with a serrate margin; a large patch of long, slender cornuti on penis.

Female.—Several types of maculation occur: One similar to the male; a second uniform dull ocherous, sparsely to rather densely sprinkled with testaceous scales; and a third uniform dull ocherous, sprinkled with testaceous scales and with conspicuous patches of fuscous scales on the inner margin of fore wing adjacent to the

transverse posterior line. As compared with the male, the fore wing is usually more angulate, with the apex more produced and the excavation between the apex and vein 4 deeper; the hind wing has the outer margin more crenulate and more produced at vein 4, and the transverse lines of both wings straighter and more sharply defined.

Alar expanse, 34–40 mm.

Genitalia (fig. 31) : Ventral operculum strongly sclerotized; ventral margin of genital opening bordered by a rather broad, straight band with smooth anterior margin; ductus bursae broad anteriorly, narrow posteriorly and with the posterior internal band strongly sclerotized; bursa copulatrix slightly scobinate near origin of ductus seminalis; signum a large ovate, slightly concave plate with slender, spine-like marginal teeth and few if any of the teeth bidentate; central area of plate with numerous spinules.

Types.[8]—In United States National Museum (*quercivoraria*, No. 55720), British Museum (*aeliaria*); location unknown (*textrinaria*, *incongruaria*).

Type localities.—"Amérique Septentrionale" (*quercivoraria*); east Florida (*aeliaria*); "Atlantic District (Penn.!)" (*textrinaria*); Hamilton, Canada (*incongruaria*).

Food plants.—Quercus.

Distribution.—United States: *Arkansas* (June, July, Aug.), *Illinois* (May, June, July), *Maine*, *Massachusetts* (Sept.), *Minnesota* (June), *Missouri* (Aug.), *New York* (May), *North Carolina* (May), *Oregon* (July), *Pennsylvania* (May, June, July), *Wisconsin*. Canada: *British Columbia* (May, June).

One hundred and thirty-six specimens examined.

Remarks.—This species is one of the most variable in color and maculation yet studied, and the variation is greater among the males than the females.

6. BESMA QUERCIVORARIA ENDROPIARIA (Grote and Robinson)

Ellopia endropiaria Grote and Robinson, Ann. Lyc. Nat. Hist. New York, vol. 8, p. 457, 1867.—Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, No. 4653, 1917.—McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5144, 1938.

Therina endropiaria Packard, Rep. U. S. Geol. Surv. Terr., vol. 10, p. 542, 1876 (generic transfer of *Ellopia endropiaria* Grote and Robinson).

Therina endropiaria (Grote and Robinson) Dyar, Psyche, vol. 8, p. 407, 1899.—Hulst, U. S. Nat. Mus. Bull. 52, p. 334, 1903.

Therina fatuaria Strecker, Lepidoptera, Rhopaloceres and Heteroceres, indigenous and exotic, Suppl. 2, p. 8, 1899.

[8] The name *trilinearia* occurs only in Packard's key, *quercivoraria* being substituted for it in the text.

Male.—Similar to the extremely uniform pale whitish-ocherous forms of *quercivoraria*, but with the surface of the wings appearing somewhat smoother and sheeny; sordid whitish ocherous, evenly sprinkled with cinereous irrorations.

Alar expanse, 28–32 mm.

Genitalia inseparable from those of typical *quercivoraria*.

Female.—Similar to the male in color and maculation.

Alar expanse, 30–38 mm.

Genitalia like those of typical *quercivoraria*.

Types.—In "Central Park Collection" (?)[9] (*endropiaria*); Field Museum (*fatuaria*).

Type localities.—"Atlantic District (Penn.)" (*endropiaria*); near Montreal, Canada (*fatuaria*).

Food plants.—*Quercus*.

Distribution.—UNITED STATES: *Illinois* (May, June), *Iowa* (June), *Maine* (June), *Maryland*, *Massachusetts*, *Michigan* (Aug.), *New Jersey* (June), *New York* (May), *Pennsylvania* (May, June), *Vermont*, *Virginia* (July). CANADA: *New Brunswick* (Aug.), *Ottawa* (May, June).

Fifty-three specimens examined.

Remarks.—Hitherto *endropiaria* has been treated as a distinct species. The slighter angulation of the wings (especially those of the females) and the generally more sheeny appearance of most specimens of *endropiaria* would seem to justify such a treatment, since most examples of *endropiaria* are easily distinguished from those of typical *quercivoraria*. However, among specimens from British Columbia, Oregon, and Minnesota there are pale intermediates that intergrade with specimens of *endropiaria* and are separable only by locality labels. There are no constant structural differences in the genitalia or larvae of the two forms. In view of the easy separation of most examples, the name merits retention and designates a variety of *quercivoraria* but no more than that.

7. BESMA BREA (Druce)

PLATE 5, FIGURES 15, 15A; PLATE 10, FIGURE 34

Metanema brea DRUCE, Biologia Centrali-Americana, Insecta, Lepidoptera-Heterocera, vol. 2, p. 68, 1892; vol. 3, tab. 47, fig. 26, 1881–1900.

Male.—Upper surfaces of fore and hind wings reddish brown with a metallic luster, thickly irrorated with yellow; body and under surfaces of wings paler. Fore wing with two rather straight subparallel transverse lines; anterior and posterior lines edged inwardly and outwardly respectively with gray; a black distal dot. Hind

[9] Grote, Can. Ent., vol. 14, p. 109, 1882.

wing with a large patch of yellow scales at apical angle, the patch divided by a wavy, reddish line; a medial transverse line appearing as a continuation of posterior transverse line of fore wing; outer margin crenulate, produced at vein 4.

Alar expanse, 35 mm.

Genitalia (figs. 15, 15A) resemble those of *quercivoraria* but have the harpe more robust; gnathos narrower, more produced apically; furca longer and more dilated distally; augerlike distal armature of aedeagus without an apical production.

Female.—Coloration much paler than the male. Resembles some examples of *quercivoraria* but easily separable by gray borders of transverse lines and rather large patch of ferruginous scales on outer margin of fore wing between veins 2 and 4; a much larger similar patch on hind wing extending from medial transverse line to outer margin, the ferruginous scales more dense below vein 4. Wings paler and less distinctly marked underneath than above.

Alar expanse, 36 mm.

Genitalia (fig. 34) very similar to those of *quercivoraria* but with many of the marginal teeth bidentate. Sclerotization of the ductus bursae not extensive, posterior internal band less than one-half the length of the ductus.

Type.—In British Museum.

Type locality.—Volcan de Chiriquí, 3,000 feet (Champion), Panama.

Food plant.—Unknown.

Distribution.—Costa Rica: Juan Vinas (June).

Two specimens examined.

Remarks.—In view of the fact that considerable variation normally occurs in the genus, I am of the opinion that the material representing the species in the United States National Museum is properly determined even though the pattern of the markings is not so definite and contrasting as that shown in Druce's figure. He had but a single male specimen before him when he described the species.

8. BESMA MATTEARIA (Schaus)

Plate 5, Figures 13, 13A; Plate 10, Figure 33

Endropia mattearia Schaus, Trans. Amer. Ent. Soc., vol. 27, p. 180, 1901.

Male.—Closely resembles *brea* but larger and with a more pronounced reddish tinge; upper surfaces of wings appearing smoother, irroration of yellow scales weaker and yellow patches not so distinct.

Alar expanse, 38 mm.

Genitalia (figs. 13, 13A) similar to those of *brea* but distinguishable by the slenderer harpe, somewhat broader gnathos, and more pronounced distal dilation of the furca.

Female.—Similar to *brea* but with upper surface of wings appearing smoother and somewhat more reddish.

Alar expanse, 33–42 mm.

Genitalia (fig. 33) similar to those of *brea* but with sclerotization of the ductus bursae extensive, extending from the genital opening to the junction of ductus bursae and bursa copulatrix.

Type.—U.S.N.M. No. 12491.

Type locality.—Jalapa, Mexico.

Food plant.—Unknown.

Distribution.—MEXICO: *Jalapa.* GUATEMALA: *Purulha.* HONDURAS: (no additional information on label).

Eleven specimens examined.

Remarks.—The distribution and close similarity of *brea* and *mattearia* suggest that they may represent a single variable species. With only two specimens of *brea* it is not possible to determine the constancy of the structural differences apparently distinguishing them.

EVITA, new genus

Genotype.—Therina hyalinaria Grossbeck.

In addition to characters noted for the group: Apex of male antenna simple. Fore wing with or without two transverse lines. Hind wing (fig. 2A) with or without a single transverse line, veins 6 and 7 stalked. Male genitalia with gnathos armed with numerous stout spines. Female genitalia with signum strongly sclerotized; without a sclerotized band bordering ventral margin of genital opening.

Remarks.—Closely resembles some species of *Lambdina* in genitalia but readily separated by the stalking of veins 6 and 7 of the hind wing.

KEY TO THE SPECIES OF EVITA

1. Fore wing pale whitish ocher, hyaline, without subterminal spot ..... 1. hyalinaria (Grossbeck)
   Fore wing dark olive-brown, with a small yellowish subterminal spot between veins 7 and 8 ..... 3. perpectinata (Schaus)

1. EVITA HYALINARIA HYALINARIA (Grossbeck)

PLATE 7, FIGURES 19, 19A; PLATE 9, FIGURE 29

Therina hyalinaria GROSSBECK, Proc. Ent. Soc. Washington, vol. 10, p. 88, 1908.
Ellopia hyalinaria (Grossbeck) BARNES and MCDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4650, 1917.—MCDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part I, Macrolepidoptera), No. 5141, 1938.

Male.—Head, labial palpus, and anterior part of thorax pale whitish ocherous; abdomen and posterior part of thorax sordid white. Wings

very thin, translucent, uniformly pale whitish, ocherous and without transverse lines, and discal or subterminal dots.

Alar expanse, 28 mm.

Genitalia (figs. 19, 19A) : Harpe simple; uncus a strong hook, dilated basally; gnathos stout, with numerous coarse spines; furca not strongly compressed, length slightly less than width of harpe at base; spinules on the dorsal surface of furca essentially like those of gnathos; anellus weakly sclerotized, scobinate; penis without cornuti.

Female.—Similar to the male in color and markings.

Alar expanse, 32 mm.

Genitalia (fig. 29): Ventral operculum moderately sclerotized; ventral margin of genital opening not sclerotized; posterior internal band extending about one half the length of the ductus bursae; bursa copulatrix bulbous; signum a strongly sclerotized reniform plate with two prominent spines.

Type.—U.S.N.M. No. 11874.

Type locality.—Southern Arizona.

Food plant.—Unknown.

Distribution.—United States: *Arizona.*

Three specimens examined.

Remarks.—Except for the somewhat duller appearance of the wings, the examples of *hyalinaria* are indistinguishable from some of those of *blandaria*, which is discussed next.

2. EVITA HYALINARIA BLANDARIA (Dyar)

Therina blandaria Dyar, Proc. U. S. Nat. Mus., vol. 51, p. 27, 1916.

Male.—Similar to *hyalinaria* in habitus. Color and maculation variable, ranging from forms that are conspicuously sprinkled with fuscous, with two (sometimes obscure) transverse lines on the fore wing, the lines slightly curved and rather diffuse and with a similar line on the hind wing appearing as a continuation of the transverse posterior of the fore wing, to forms that are a uniform pale ocherous with the wings rather clear and transparent, the surface appearing somewhat glazed and the markings obsolete.

Alar expanse, 26–31 mm.

Genitalia like those of typical *hyalinaria.*

Female.—Similar to the male in color and markings.

Alar expanse, 27 mm.

Genitalia like those of typical *hyalinaria.*

Type.—U.S.N.M. No. 18882.

Type locality.—Popocatepetl Park, Mexico.

Food plant.—Unknown.

Distribution.—Mexico: Popocatepetl Park (June, July), Cuajimalpa.

Twenty-three specimens examined.

Remarks.—It appears from the similarity in habitus, color, maculation and genitalic structures of *blandaria* and *hyalinaria* that only one species with two varieties is involved; *hyalinaria* occurring in the arid southwestern part of the United States (also probably the adjacent northern Mexican area) and *blandaria* in the more southern and humid part of Mexico. The extremely immaculate examples of *blandaria*, with the lines obsolete, intergrade with the specimens of *hyalinaria* and are distinguishable only by the slightly more glazed appearance of the wings.

3. EVITA PERPECTINATA (Schaus)

PLATE 7, FIGURES 18, 18A

Therina ? perpectinata SCHAUS, Ann. Mag. Nat. Hist., ser. 8, vol. 10, p. 235, 1912.

Male.—Head, labial palpus, and thorax dark smoky fuscous; fore wing dark brown, with an olivaceous tinge and metallic luster, a small yellowish spot near the apex between veins 7 and 8; hind wing paler, light smoky fuscous.

Alar expanse, 40 mm.

Genitalia (figs. 18, 18A): Harpe simple, uncus stout, a strong hook; gnathos with the apical process compressed, narrow with numerous coarse spines; furca with a few spines distally; penis with long slender cornuti.

Female.—Unknown.

Type.—U.S.N.M. No. 17709.

Type locality.—Ojo de Agua, Costa Rica.

Food plant.—Unknown.

Distribution.—COSTA RICA: Ojo de Agua (Oct.).

One specimen examined.

Remarks.—This species, tentatively referred to *Therina* when described by Schaus, is more closely related generically to *hyalinaria* than any species yet studied.

MISCELLANEOUS COMMENTS

Notes on the synonymy and assignment of species to other genera:

NEMATOCAMPA EXPUNCTARIA Grote

Nematocampa expunctaria GROTE, Can. Ent., vol. 4, p. 101, 1872.—PACKARD, Rep. U. S. Geol. Surv. Terr., vol. 10, p. 471, 1876 (cited as a synonym of *Nematocampa filamentaria* Guenée).

Nematocampa limbata f. *expunctaria* (Grote) BARNES and MCDUNNOUGH, Check list of the Lepidoptera of Boreal America, No. 4680, 1917.—MCDUNNOUGH, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5044, 1938.

Type.—In Academy of Natural Sciences of Philadelphia.

Type locality.—Alabama.

Remarks.—Grote, commenting[10] on Packard's reference of *expunctaria* to *filamentaria* without having seen the type of *expunctaria*, expressed the belief that when the type of *expunctaria* was examined it would be found to be a different species. Recently I have had opportunity to examine Grote's type to dissect the genitalia. As compared with *filamentaria*, Grote's type (unique) differs in the following respects: Markings absent other than two transverse lines on the fore wing and a single transverse line on the hind wing; harpe with apex of ventral margin pointed, triangular-form; anellus with the lateral arms straighter and dilated below bifurcation; vinculum (ventrally) broader and less incised; aedeagus slenderer and smaller. The differences in maculation and structure of *filamentaria* and *expunctaria* substantiate Grote's contention regarding the distinctness of his species, and it should be given full specific rank.

NEMATOCAMPA BRUNNEOLINEATA (Hulst), new combination

Eugonobapta brunneolineata Hulst, Journ. New York Ent. Soc., vol. 5, No. 3, p. 218, 1901.

Ellopia brunneolineata (Hulst) Barnes and McDunnough, Check list of the Lepidoptera of Boreal America, No. 4658, 1917.—McDunnough, Check list of the Lepidoptera of Canada and the United States of America (Part 1, Macrolepidoptera), No. 5151, 1938.

Type.—In Rutgers College collection.

Type locality.—Florida.

Remarks.—Dyar[11] commenting on the type of *brunneolineata* stated: "One type. I think it is a very badly rubbed specimen of *Ania limbaria* Haw., that originally had but very little purple."

On a recent visit to Rutgers I found the Hulst type to be in excellent condition, with no effects of rubbing evident. Circumstances would not permit dissection of the genitalia. Superficially *brunneolineata* is very much like *expunctaria*, and in view of the proximity of their type localities (*brunneolineata*, Florida; *expunctaria*, Alabama), similarity of color, maculation, hind tibiae, etc., the two forms will probably prove to be conspecific. Dissection of the genitalia of *brunneolineata* (also a unique) will be necessary definitely to establish their status. Pending dissection of the genitalia, superficial structures justify its removal from the group with which it has been associated and assignment to the genus *Nematocampa* Guenée.

[10] Can. Ent., vol. 14, p. 110, 1882.

[11] Proc. Ent. Soc. Washington, vol. 6, No. 4, p. 226, 1904.

NEPYTIA NOMIA (Druce), new combination

Therina (?) *nomia* Druce, Biologia Centrali-Americana, Insecta, Lepidoptera-Heterocera, vol. 2, p. 51, 1892; vol. 3, tab. 46, fig. 4, 1881–1900.

Type.—In British Museum.
Type localities.—Mexico: Jalapa and Las Vegas.

NEPYTIA MARIARIA (Schaus), new combination

Therina mariaria Schaus, Insecutor Inscitiae Menstruus, vol. 11, p. 161, 1923.

Type.—U.S.N.M. No. 26564.
Type locality.—Guatemala: Volcan Santa Maria.

DESTUTIA MODICA (Schaus), new combination

Therina modica Schaus, Ann. Mag. Nat. Hist., ser. 8, vol. 8, p. 593, 1911.

Type.—U.S.N.M. No. 17451.
Type locality.—Costa Rica: Juan Vinas, Sitio.

Generic reassignment of the following species is held in abeyance pending completion of the revisional study of the subfamily:

Ellopia myandaria Walker, List of the lepidopterous insects in the collection of the British Museum, vol. 20, p. 164, 1860.

Type.—In British Museum.
Type locality.—Mexico: Oaxaca.

Ellopia despoliata Walker, List of the lepidopterous insects in the collection of the British Museum, vol. 26, p. 1511, 1862.

Type.—In British Museum.
Type locality.—Venezuela (no further locality cited).

Therina betala Druce, Biologia Centrali-Americana, Insecta, Lepidoptera-Heterocera, vol. 2, p. 50, 1892; vol. 3, tab. 45, fig. 28, 1881–1900.

Type.—In British Museum.
Type locality.—Guatemala: Cerro Zunil, 4,000 to 5,000 feet (Champion).

Therina munda Druce, Biologia Centrali-Americana, Insecta, Lepidoptera-Heterocera, vol. 2, p. 50, 1892; vol. 3, tab. 45, fig. 28, 1881–1900.

Type.—In British Museum.
Type locality.—Mexico: Amecameca.

Therina bada Druce, Biologia Centrali-American, Insecta, Lepidoptera-Heterocera, vol. 2, p. 51, 1892; vol. 3, tab. 46, figs. 1 and 2, 1881–1900.

Type.—In British Museum.

Type localities.—Guatemala: Totonicapam, 8,500 to 10,500 feet, Quiche Mountains, 7,000 to 9,000 feet (Champion).

Therina atomaria Schaus, Trans. Amer. Ent. Soc., vol. 27, p. 179, 1901.

Type.—U.S.N.M. No. 12445.
Type locality.—Costa Rica: Juan Vinas.

Therina punctillaria Schaus, Trans. Amer. Ent. Soc., vol. 27, p. 179, 1901.

Type.—U.S.N.M. No. 12442.
Type locality.—Mexico: Oaxaca.

Therina templadaria Schaus, Trans. Amer. Ent. Soc., vol. 27, p. 179, 1901.

Type.—U.S.N.M. No. 12444.
Type locality.—Mexico: Jalapa.

Therina pardiria Schaus, Trans. Amer. Ent. Soc., vol. 27, p. 245, 1901.

Type.—U.S.N.M. No. 12446.
Type locality.—Panama: Chiriquí.

Therina coalitaria Schaus, Ann. Mag. Nat. Hist., ser. 8, vol. 8, p. 594, 1911.

Type.—U.S.N.M. No. 17451.
Type locality.—Costa Rica: Mount Poas.

Ellopia punctularia Schaus, Ann. Mag. Nat. Hist., ser. 8, vol. 9, p. 424, 1912.

Type.—U.S.N.M. No. 17600.
Type locality.—Costa Rica: Juna Vinas or Cartago.
Remarks.—Schaus' description was based on a male, and he cited Cartago as its habitat. The species is represented in the collection by two specimens, a male bearing the type label, but with a Juan Vinas locality label, and a female bearing the Cartago locality label.

Ellopia irrorata Schaus, Ann. Mag. Nat. Hist., ser. 8, vol. 9, p. 425, 1912.

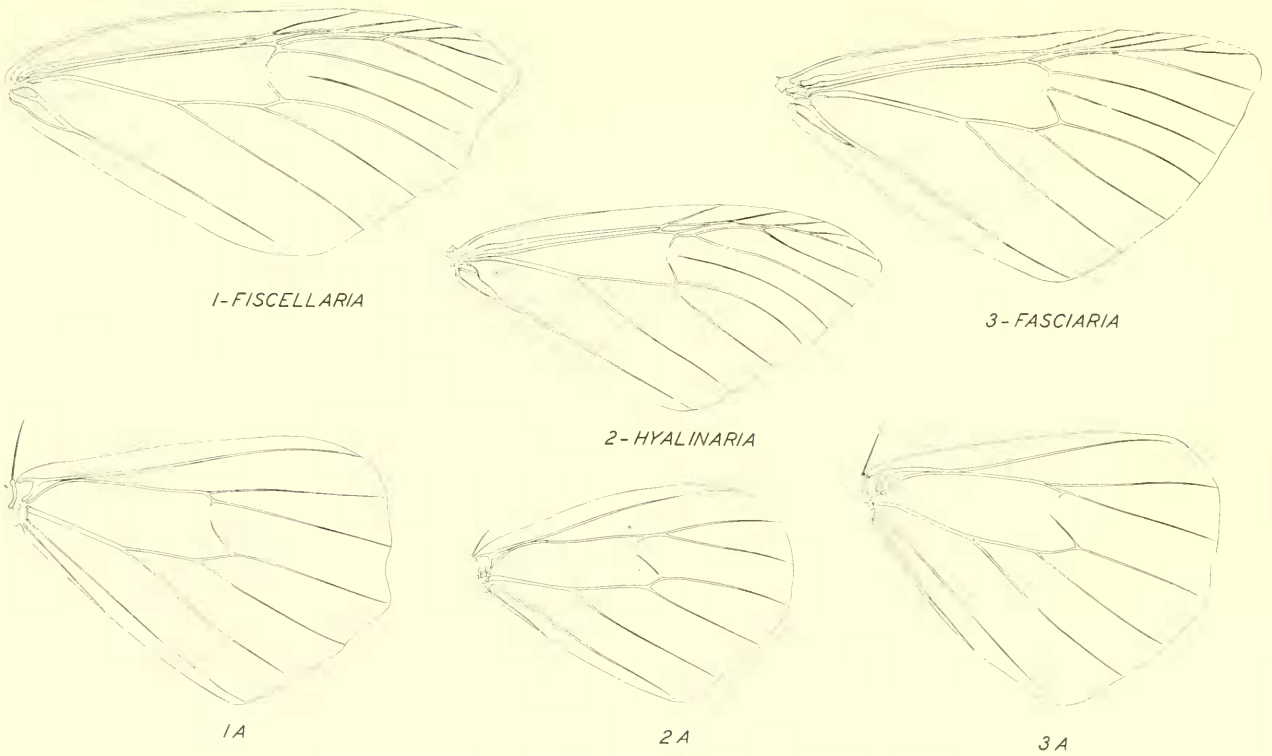
Type.—U.S.N.M. No. 17601.
Type locality.—Costa Rica: Juan Vinas.

Ellopia vincinaria Schaus, Ann. Mag. Nat. Hist., ser. 8, vol. 9, p. 425, 1912.

Type.—U.S.N.M. No. 17602.
Type locality—Costa Rica: Turrialba.

Ellopia silanaria Schaus, Ann. Mag. Nat. Hist., ser. 8, vol. 10, p. 235, 1912.

Type.—U.S.N.M. No. 17708.
Type locality.—Costa Rica: Mount Poas.



1–1A. *Lambdina fiscellaria* (Guenée): Venation of fore and hind wings.
2–2A. *Evita hyalinaria* (Grossbeck): Venation of fore and hind wings.
3–3A. *Therina fasciaria* (Linnaeus): Venation of fore and hind wings.